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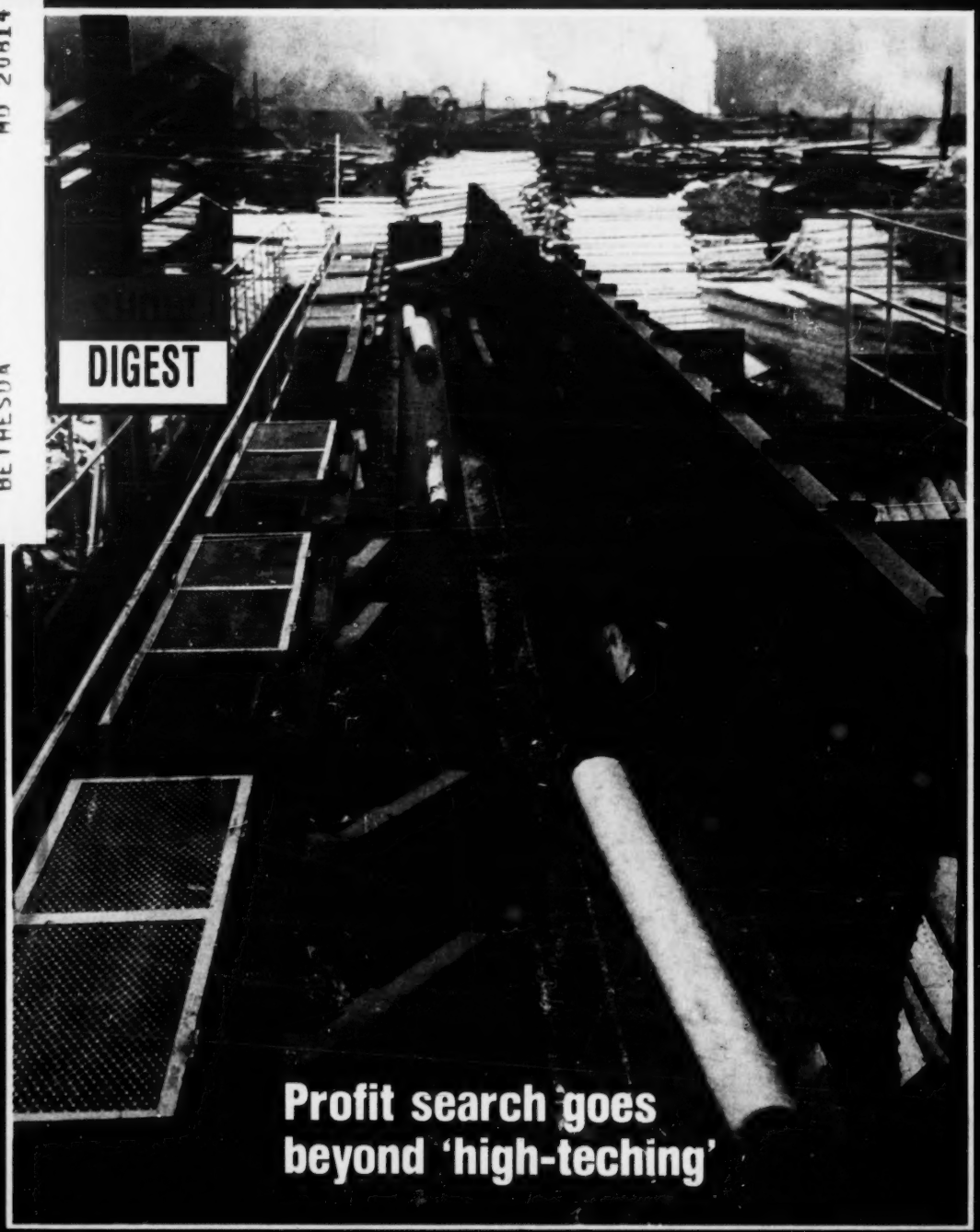

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FOREST INDUSTRIES

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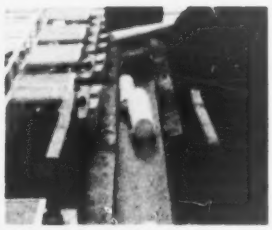

About the cover: *Mill adds machines, computers to make a profit. See p. 15. Photograph by Jean Sorensen.*

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Sawmill automation is a given, but how is it best done?

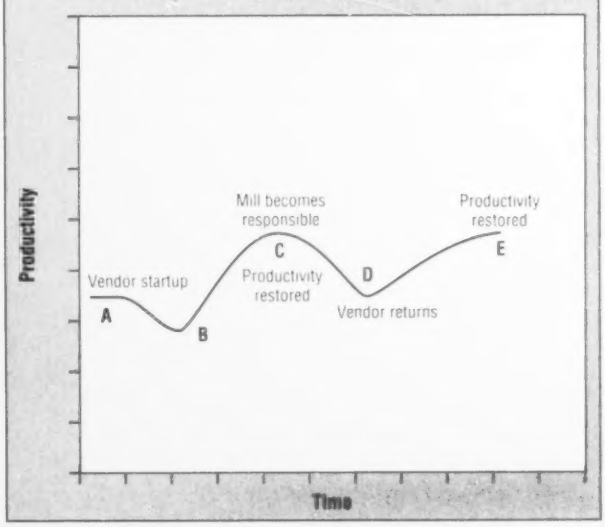
Optimizers promise efficiency and higher profits, but crews must know how to work with the systems to gain promised benefits

BY ROBERT HUNTER

To increase productivity, most sawmill managers accept the fact that they have to automate their mills. Capital-spending figures from all major lumber-producing regions in North America showed heavy outlays for process control systems or optimizers in 1988-89.

David Cohen and Steven Sinclair reported that improvements in technology have been credited for the most productivity growth in the lumber manufacturing industry. Their study provides "empirical evidence that increased adoption of innovative processing technologies is linked to superior performance. Companies with the highest levels of adoption exhibited average to better than average profitability and were gaining market share."

FIG. 1—Startup curve for new machinery



The list of sawmill optimization systems in Table 1 suggests that total, mill-wide control or automation is available today. Many of these systems are already in their second or third generation of development.

Installing an optimizer may not result in an immediate increase in productivity; instead, there may be a periodic loss of earnings because of setup errors or startup problems.

TABLE 1—Sawmill optimization systems

Manufacturing:

Bucking
Primary breakdown
Cant
Edger
Trimmer
Grade readers
Kiln control
Energy

Some startups shaky

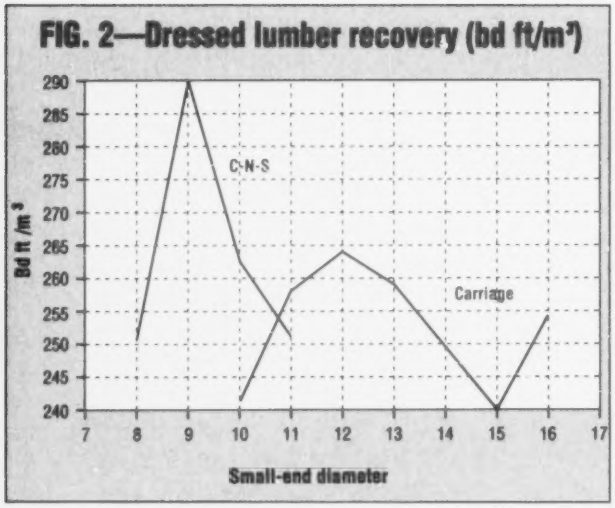
Fig. 1 shows the process a mill may follow during startup of an optimizer control system. This mill performed at a relatively constant level until the optimizer system started up (A).

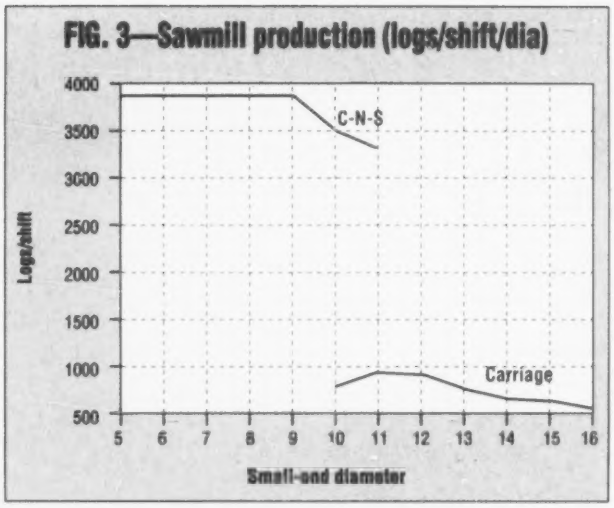
The decline in performance may be attributed to system debugging. As familiarity with the optimizer control system increases, so does mill performance, which soon surpasses pre-optimizer levels (B). The time associated with this milestone could be weeks or months.

At point C, the vendor completes his checklists of tasks and the mill becomes responsible for the optimizer. In many cases, mill performance or optimizer performance drops off after the vendor leaves. After a steady decline in performance, the vendor is called back to help resolve problems and do more training.

This startup pattern may be repeated several times over a number of months due to equipment malfunction or optimizer tuning errors.

The successful optimizer project requires a few key ingredients. This startup curve can be minimized by assign-





ing qualified people to the project in its early stages. Participation with the vendor before the optimizer is shipped will ensure that both hardware and software are debugged and will increase the crew's familiarity with system operation.

Management's role

The first step for action or progress is knowing your current position. Management's role in the startup of an optimizer control system is to identify the potential economic benefits and track their progress over time.

Several benefits are possible from an optimizer control system: increased production, recovery improvements, less economy lumber, less planermill trim loss, or a higher chip factor. By tracking these variables, we can evaluate the impact of the control system and tune it for optimum performance.

Today's optimizers have no capabilities to adjust for manufacturing trends or to optimize the process. People transform information from optimizer production reports and react accordingly, thus creating the feedback control system.

Most mills already have multiple scanning systems operating, but place little value on their production reports. Reports are analyzed at the end of each shift, instead of during the shift. The next logical step is to turn the optimizer into a real-time feedback control system.

In a real-time system, mill people will monitor various machine centers and be alerted to manufacturing problems. They will diagnose the problem, take corrective action, then monitor the real-time information to see if their actions corrected the problem.

Why automate mill-wide?

Mill-wide automation should provide a conduit for information to flow toward management for strategy and control. We expect the optimizer to measure the product and control the process. Using information generated by the optimizer is the next logical step in making the operation more profitable.

Combining production information from the optimizers and cost information from administrators will give managers the information they will need to formulate a strategy and direct the business. Current practices of gathering production reports from each optimizer and then reentering the data in administrative computer systems will be streamlined by networking the computers with each other.

The graph in Fig. 2 shows the dressed lumber recovery for each small-end-diameter log by machine center. This graph alone suggests that logs in the 11-in. diameter class should be processed on the carriage instead of the Chip-N-Saw for higher recovery.

Fig. 3 shows the number of logs per shift processed by small-end diameter for each machine center. The Chip-N-Saw slows down for logs greater than 9 in., while the carriage struggles to properly position logs less than 11 in. Both factors reduce log throughput. As the log diameter increases, the number of saw lines increases, which accounts for the uniform decrease in throughput.

If we combine data from the dressed lumber recovery graph and the sawmill production graph, we can develop machine performance curves for each small-end diameter class of logs (see Fig. 4).

Performance curves are a function of lumber, chip, veneer and fuel selling prices. As these products change in price, so will the curves.

Logs smaller than 11 in. should be processed on the Chip-N-Saw even though the recovery graph indicated that 11 in. logs had a higher recovery on the carriage. Logs ranging from 11.1 to 15.5 in. should be peeled on a lathe, as this particular complex includes a sawmill and a veneer plant. Logs over 15.6 in. should go to the carriage. These values will change as mill personnel tune their optimizers and improve their manufacturing process.

Strategic resource management

Trees are the strategic resource in the wood products industry. Automating our mills is only one step in increasing productivity and ensuring survival in the '90s. Optimizers will provide planners with data for using scientific methods to direct their businesses. These scientific methods

include linear programming, simulation and database management.

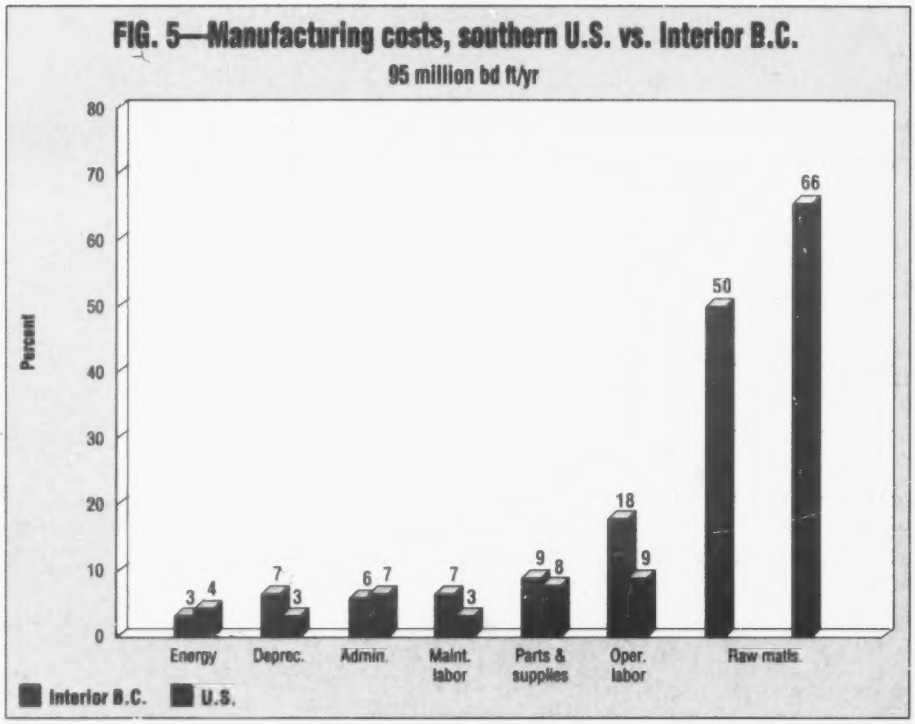
Linear programming (LP) will identify the ideal product mix and raw material, based on these factors:

- Selling prices of finished products.
- Raw material cost and supply.
- Processing rates and equipment capabilities.
- Lumber recovery.
- Manufacturing cost.

Simulation will allow the mill to test the LP solution and identify production bottlenecks. Each optimizer will be capable of simulating tuning changes from historical data to predict their impacts on mill production.

Databases will be developed to track actual mill performance against forecasts. Over time, the database will show the relationship between raw material quality, optimizer or control system tuning, finished product recovery and plant earnings.

This data will also help buy raw material by defining the break-even point for timber purchases.



Management challenges in the '90s

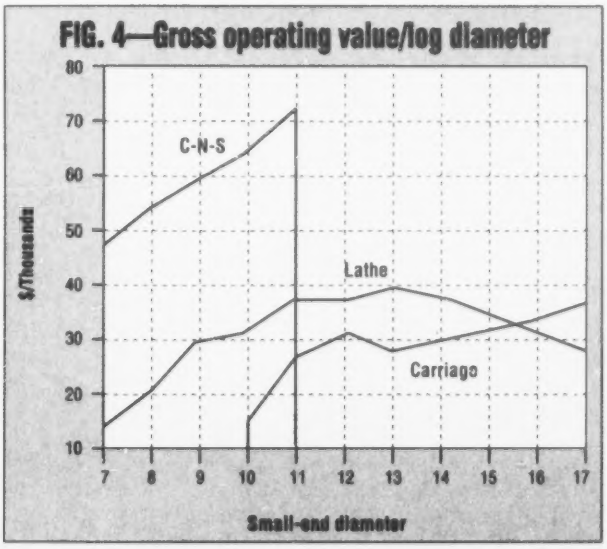
North American lumber producers face many common and uncommon challenges. Fig. 5 depicts the percentage cost breakdown for producing 95 million bd ft a year of dimension lumber in both a Canadian and U.S. mill.

Raw material and labor represent 80% to 85% of the total cost. The cost of raw material is considerably less in British Columbia, but this is offset by labor rates twice as high as in the U.S. South.

It is necessary to note that we are not comparing *total* cost, but only the *percentage* cost breakdown for each geographic region. Both of the regions can reduce labor costs and can increase lumber recovery through automation.

The challenge for management will be to define the markets that complement their raw material supply and to develop a strategy for automation and utilization. This strategy will not only include computer controls, hardware and software. It must also include "humanware."

"Humanware" is otherwise known as people—the valuable employees who will understand, maintain and use the computer control systems in order to achieve management's goals. ■



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